# City of Eugene, Oregon
# Stormwater Monitoring Plan

In Accordance with the
Requirements of National Pollutant
Discharge Elimination System (NPDES) Permit
Number 101244, File Number 107989

December 2005

**STORMWATER MONITORING PLAN**

This plan describes stormwater and receiving water quality monitoring to be conducted under the City of Eugene's NPDES Permit Number 101244. The NPDES permit specifies that water quality monitoring be performed to determine whether there is a reasonable likelihood for stormwater from the MS4 to cause or contribute to water quality degradation of receiving waters. Monitoring under the plan includes sampling for the analysis of pollutants in the municipal separate stormwater sewer system (MS4) stormwater and in the Willamette River and Amazon Basin streams, which are receiving water bodies for MS4 stormwater.

A. Stormwater – Storm Event Monitoring using Focused Basin Approach

Monitoring will be conducted at specific discharge points within the MS4 to characterize water quality from selected individual basins. A minimum of two storm events will be monitored each permit year. Additional storm events may be monitored if significant pollutant concentrations are detected; the additional storm event monitoring would be used for source characterization. Additional storm event monitoring may consist of sampling and analysis for a subset of pollutants that focus on those necessary for site characterization.

1. Samples will consist of flow-weighted composite samples, and grab samples collected during "first flush".

2. Stormwater system must be sampled at locations discharging to the following surface water bodies:

   - A3 Channel (part of the MS4)
   - Amazon Creek
   - Amazon Diversion Channel
   - Willow Creek
   - Willamette River

3. Stormwater quality monitoring constituents will include:

   Flow-weighted Composite Samples

   a. Total & Dissolved metals: Samples will be collected using clean techniques sampling and analyzed using low detection methods for comparison with current Oregon Water Quality Criteria.
      - Arsenic
      - Cadmium
      - Calcium (to calculate Hardness)
      - Chromium
      - Copper
      - Lead
      - Magnesium (to calculate Hardness)

- Mercury
- Nickel
- Silver
- Zinc

b. Ammonia as Nitrogen
c. Nitrate+Nitrite as Nitrogen
d. Total Kjeldahl Nitrogen
e. Ortho Phosphorus
f. Total Phosphate
g. Total Dissolved Solids
h. Total Suspended Solids
i. Specific Conductance
j. Biochemical Oxygen Demand
k. Chemical Oxygen Demand
l. Total Organic Carbon
m. Turbidity

Grab Samples (First Flush)

n. Escherichia coli
o. Fecal Coliform
p. Silica Gel Treated Hexane Extractable Material (Oil & Grease)
q. Chlorinated hydrocarbons (A-3 Channel Only; for source characterization of pollutants on 303(d) list)

Field Measurement

r. Dissolved Oxygen
s. pH
t. Temperature
u. Stormwater Flow

B. Ambient Surface Water Quality Monitoring

Surface water sites on streams within the Amazon Basin and on the Willamette River will be routinely sampled and analyzed to characterize water quality.

4. The monitoring program will include eleven (11) ambient sites – five (5) on the Willamette River and six (6) on streams within the Amazon Basin. Monitoring stations will consist of those previously sampled with established historical trends. An additional site will be added to the Willamette River monitoring sites and is located within the Delta Ponds area.

5. A total of six (6) sampling events will be conducted each calendar per year.

6. Receiving water body samples will be analyzed for all water quality parameters listed in Section 3 above except Silica Gel Treated Hexane Extractable Material (Oil & Grease). Historical data for the Ambient Water Quality Monitoring program have shown that no measurable quantities of oil and grease are detected in ambient receiving water bodies.

C. Monitoring for Bacteria Pilot Study

*See W3 BMP Fact Sheet in [the City's Stormwater Management Plan] for a description of the Bacteria Pilot Study.*

7. Pre-BMP Implementation Site Characterization and Observation - Maps will be generated of the stormwater system for the Polk Street sub-basin to confirm system configuration, sub-basin boundaries, and drainage pathways. Land use types, ownership, easements and rights of way, and aerial photos will be reviewed to locate monitoring stations, inform BMP selection and design, and assess BMP effectiveness.

   Ground surveys of the site will be done on a regular and frequent basis to document basin conditions such as amount, type and location of wildlife and domestic pets; human behaviors; location and number of domestic animal waste piles; conditions within commercial loading areas, recycling areas and garbage dumpster areas, etc. A check-sheet will be developed to standardize observations; digital photos will be used to augment documentation.

8. Pre-BMP Implementation Storm Event Monitoring – Stormwater collection and analysis for bacteria (fecal coliform and *Escherichia coli*) from at least three (3) storm events each year for two years or as determined necessary to characterize bacteria source-contribution areas to establish baseline conditions. Site selection will focus on the primary land-use areas, primarily those that are greater than 2% total land coverage. Other land use areas might be considered if characterization indicates significant knowledge gaps. The following sampling program is planned:

   Pre-BMP sampling for bacteria will consist of several types and numbers and will be defined based on project logistics and needs. Collection of samples for bacteria analysis may include:

   - Grab samples from selected collection basins and piped systems
   - Grab samples from Amazon Creek upstream and downstream of Polk Street MS4 outfalls
   - Grab samples from major outfall pipes
   - Sediment samples from selected collection basins

*See W3 BMP Fact Sheet in [the City's Stormwater Management Plan] for a description of BMP implementation.*

9. Post-BMP Implementation Site Characterization & Observation – Ground surveys of the site will be done on a regular and frequent basis following BMP implementation

to document basin conditions such as amount, type and location of wildlife and domestic pets; human behaviors; location and number of domestic animal waste piles; conditions within commercial loading areas, recycling areas and garbage dumpster areas, etc. The check-sheet developed for initial site characterization and observation will be utilized for this element of the program to standardize observations; digital photos will be used to augment documentation.

10. Post-BMP Implementation Storm Event Monitoring – This monitoring will be used to evaluate BMP effectiveness. The sampling program will be dependent on the outcome of source contribution characterization. At least three (3) storm events will be sampled each year that monitoring is conducted, or as determined is necessary for site characterization. The types and number of samples will be defined based on project logistics and need, but for consistency will generally consist of samples similar to those listed in section B above.

11. Data Analysis & Reporting – Data from the study will be analyzed to assess BMP effectiveness and will be included, to the extent that it is available, in annual NPDES reports.

D. Biological and Physical Monitoring

In terms of biological characterization, the stormwater monitoring plan includes new monitoring efforts and support for existing programs. Macroinvertebrate assessments will be done every three years in the Amazon basin at up to ten collection sites to measure environmental stress to these macroorganisms. Macroinvertebrate monitoring efforts by the Long Tom Watershed Council will also be reviewed to determine whether specific sampling locations in the Long Tom watershed can serve as a baseline to which Amazon basin macroinvertebrate data can be compared. Knowledge gained from study of the Long Tom watershed might also help to develop an objective or target for restoration efforts of macroinvertebrate communities in the Amazon basin.

In terms of physical monitoring, the city will continue efforts in developing and implementing its Open Waterway Maintenance Plan. The plan consists of visual inspection of publicly owned and managed waterways for a host of physical characteristics, including bank stability, vegetation, erosion, and channel structural integrity. Ratings assessments are currently underway, as part of the Corps Metro Waterways General Investigation Study, on all waterways in the Amazon basin to characterize the overall health of stream corridors and prioritize rehabilitation projects. The City's existing riparian forest management plan and riparian vegetation management and development efforts are consistent with the shade goals for streams in the Amazon basin described in the Draft Temperature TMDL.

Lastly, photomonitoring will continue at various locations along Amazon Creek to establish a photo-documentation of change occurring within riparian areas. This information will be useful in assessing the success of riparian rehabilitation efforts.

It is important to note that the biological and physical monitoring efforts that are planned or ongoing, are long-term programs that generally do not yield immediate results over the course of a single permit cycle.  For example, the measurable effects of shade following vegetation planting within a riparian area will likely not be known for many years after planting; maturity of riparian habitat generally takes many years after rehabilitation.  From this initial effort it is hoped that stream temperatures will decrease and dissolved oxygen increase, which will, hopefully, promote development of complex macroinvertebrate communities that signal a healthy stream environment.